INSPECTING STACK SAMPLING SYSTEMS

Purpose

This Meteorology and Air Quality Group (MAQ) procedure describes the steps to ensure that LANL stack sampling systems are in good condition, clean, and free of obstructions, as required by 40 CFR 61 Rad-NESHAP requirements. It also describes steps to be taken if a stack sampling system fails inspection.

Scope

This procedure applies to stack sampling system inspections performed by MAQ personnel annually at stacks monitored for radionuclides throughout the LANL complex.

In this procedure

This procedure addresses the following major topics:

Signatures

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Approved by: Digitally signed by Terrance L Morgan serialNumber=082197 + cn=Terrance L Morgan, ou=People, ou=Los Alamos National Laboratory, ou=Department of Energy, o=U.S. Government, c=US Date: 2005.12.13 10:43:03 -07'00' Reason: I am approving this document Location: White Rock Terry Morgan, QA Officer	Date: 11/29/05
Work authorized by: Dianne Wilburn, Acting MAQ Group Leader	Date: 11/30/05

12/13/05

General information about this procedure

Attachments

This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Stack Sample System Inspection Worksheet (example)	2

History of revision

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	12/12/05	New document, supplements and replaces MAQ-618.

Who requires training to this procedure?

The following personnel require training before implementing this procedure:

- Task order contract personnel who perform stack sampling systems inspections or support MAQ Compliance Programs that require exhaust stack flow measurements.
- MAQ technicians and staff members who perform inspections or support MAQ Compliance Programs that require stack sampling systems inspections.

Personnel previously trained to revision 0 of this procedure do not require retraining to this revision.

Training method

The training methods for this procedure are:

- **Mentored** training for personnel ***performing*** stack sampling systems inspections.
- **Self study (reading)** for personnel ***supporting*** the stack sampling systems inspections program.

Annual retraining is required and will be by "self-study" (reading). Training is documented in accordance with the procedure for training (MAQ-024).

General information, continued

Prerequisites

In addition to training to this procedure, the following training or surveillance programs are also required for technicians and staff members prior to performing stack sampling systems inspections:

- Radiological Worker II Training
- Site-specific training as required for each facility
- Basic Fall Protection, Course #1307 (for those climbing scaffolding)
- Scaffolding user training course number 14708 (for those climbing scaffolding)

A "Q" or "L" level security clearance is also required for some facilities.

Definitions specific to this procedure

IWD: Integrated Work Document.

References

The following documents are referenced in this procedure:

- MAQ-024, "Personnel Training"
- MAQ-011, "Logbook Use and Control"
- MAQ-601, "Collecting and Processing Stack Air Particulate and Vapor Samples from TA-53"
- MAQ-616, "Leak Checking LANSCE Stack Sampling Systems"
- 40 CFR 61 Appendix B, Method 114, Paragraph 4.7, Table 2
- 40 CFR 60 Appendix A, Method 5, Paragraph 4.1.4, "Leak-Check Procedures"
- UXR Borescope User's Manual

Note

Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

Background and overview of stack sampling system inspections

Background

The Environmental Protection Agency's National Emission Standard for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities, 40 CFR 61, Subpart H (Rad-NESHAP) and facility-specific requirements (e.g., TSRs and OSRs) require stack sampling systems inspections from several LANL facilities. Included in these requirements is the need to perform internal and external inspections of the sampling system and record the findings.

Overview of stack sampling systems inspection

This procedure describes the two processes required to perform the stack sampling systems inspections:

- performing an internal system inspection
- performing an external system inspection

Worker safety

Performing work safely

DO NOT perform work under conditions you consider unsafe. Before beginning work described in this procedure, review safety needs and requirements, identify hazards, and develop hazard mitigation measures. Be aware that facility configurations and hazards may change between visits. Hazards to assess include, but are not limited to the following:

Rotating machinery and electrical equipment - Work described in this procedure is performed in the vicinity of fans, motors, and other facility equipment. Do not work in the vicinity of exposed conductors or if guards are not in place on operating facility equipment.

Radiological hazards - Stack sampling locations are often radiologically controlled. Be sure to comply with all facility-specific PPE requirements before entering controlled areas.

Roofs, scaffolding and bucket trucks - Work described in this procedure will take place on roofs, scaffolding or in a bucket truck. **Fall protection equipment must be used if the performance of work requires personnel to be within 6 feet of the edge of a 6-foot or greater drop.** Additional safety precautions and equipment must be considered, and when appropriate, used to minimize the risks of injury resulting from falling equipment, lightning strikes, exposure, and other potential hazards. Safety precautions to be considered related to working at heights include:

- Use of hard-hats
- Observing safe ladder practices
- Delaying work because of dangerous weather conditions

DO NOT work on roofs and/or outdoor scaffolding during lightning storms or when lightning storms are in the area.

Facility management units - Work control is the responsibility of the Facility Manager. Obtain approval from facility management before beginning work described in this procedure**.** Ensure you have completed all facility-specific training requirements (see prerequisite training requirements on page 2).

Cleaning stack sample systems – under this procedure, only very minimal "cleaning" of dirty sample systems is allowed. Discrete particles or debris may be removed if easily accessible as part of the routine inspection process. Any cleaning activities that go beyond the scope of the IWD are not permitted under this procedure.

Equipment specifications and calibration

Acceptable equipment	Specifications for equipment to be used to perform this procedure are given below. Other equipment meeting these specifications may be acceptable.
Users manuals	Ensure a copy of the users' manual is available for all equipment used to perform stack sampling system inspections.
UXR Flexible Borescope	This borescope is used to internally inspect stack sampling systems (probes, transport lines, etc.) for any buildup or other condition which would affect sampling performance.
UXR Rigid Borescope	This borescope is used to externally inspect stack sampling systems (nozzles, transport lines, etc.) for any buildup or other condition which would affect sampling performance.

Preparing for stack inspections

General

The stack inspection work must be coordinated by the assigned MAQ team member or task order contractor. This work, in support of MAQ Compliance Programs, needs to be scheduled with the appropriate facility coordinators and facility management units.

Measurement frequency

Stack sampling system inspections are performed on exhaust stacks that are sampled continuously for radionuclides, either annually or at the direction of the Rad-NESHAP project leader. The schedule is communicated by the project leader to assigned personnel via e-mail or verbal instruction.

Note that per alternative method approval from EPA Region 6, inspections are not performed on tritium sampling systems. The periodic performance tests conducted at tritium facilities fulfill this regulatory requirement.

Facility check-in and check-out

Personnel assigned to perform the stack sampling system inspections must ensure that all check-in and check-out procedures are followed as required by the facility's site-specific training.

Obtain IWD

If not aleady available, prepare an IWD for the work at the stack. An approved IWD must be used in conjunction with this procedure. Work with facility coordinators and HSR-1 representatives to document hazards and determine PPE and training requirements.

Check field conditions

Verify no hazardous operations are being vented through the stack by following proper check-in procedures at the facility. Notify the operations center, facility coordinator, area work supervisor, and/or the local RCT to ensure the ventilation system is under normal operations and no hazardous operations are taking place. Be aware of local weather conditions as most stack sampling systems inspections are performed outdoors.

Personnel roles

A minimum of two people are needed to perform stack sampling systems inspections. One person acts as systems inspector and the other person wears appropriate PPE to handle all potentially contaminated equipment.

Preparing for stack inspections, continued

Special tools or equipment

The following tools and equipment are also needed to perform this procedure:

- UXR Rigid Borescope
- UXR Flexible Borescope
- Anti-contamination gloves
- Anti-contamination cloths (for example, "Chem-Wipes")

If video or image capture documentation of the inspection is required, the appropriate cameras, computer links, and view screens are needed. Become familiar with equipment setup and image recording processes before field use.

Field checklist and records

MAQ stack inspection staff will complete the "Stack Sample System Inspection Worksheet" (Attatchment 1) while performing the work in the field. This information will be documented in ink, signed and dated. A field notebook will be used for miscellaneous field notes. Records will be kept by the assigned MAQ stack inspection team member. Logbooks will be maintained according to procedure MAQ-011.

Schedule stack inspection

Verify with facility operations personnel that the stack will be running under normal conditions and that no atypical operations are ongoing which could release unanticipated pollutants into the stack (acid fuming, mercury operations, etc.). Schedule inspection date.

Set up and insection of scaffolding at ES-2

At LANSCE stack only:
Contact the Facility Coordinator for Building 7 to arrange for the set up of the scaffolding. An inspection of the scaffolding is required before it is used. If performing this procedure extends beyond one day, an inspection of the scaffolding is required for each successive day.

Inspecting Stack Sampling Systems

Steps to inspect stack

To inspect stack sampling systems in a stack, duct, or vent, perform the following steps:

Step	Action
Obtain worksheet	
1	Obtain a worksheet (checklist), field notebook and the appropriate IWD for the specific sampling system(s) to be inspected.
Preinspection documentation	
2	Conduct prejob briefing and sign Part 3 of the IWD.
3	Prior to inspection, document the following on the worksheet: • Technical Area, Building, and Exhaust Stack (ES) ID Number • Names of Crew Members • Probe Type • System Monitors • Reason for Inspection • Security Needs • RCT Needs • Local Power Supplies • Sample Station Outlet Usage • Sample Filter Removal (including times)
Verify exhaust system is exhausting ambient air and inspecting system	
Step	**Action**
4	Check in with the facility coordinator or operations center before starting the stack sampling system inspection. Again verify that the stack is not exhausting abnormal levels of radioactive or other hazardous process air and that the system is under normal operating conditions.
5	Visually examine the exhaust system to identify any unusual conditions or variations in the configuration of the exhaust system. Record any unusual findings in field notebook. Report these findings to the facility representative and determine if the facility will allow the work to proceed under the observed conditions.
Perform internal sampling systems inspections	
6	Disconnect any electrical equipment (heat trace, etc.) on sample system that could affect or be affected by the inspection process.
7	Remove MAQ sample media (paper filter and/or charcoal) and store in glassine envelope, according to MAQ-109 and/or MAQ-601. Note the date and time of removal.

Steps continued on next page.

Inspecting Stack Sampling System, continued

Step	Action
8	Note general condition of sample system external components, including the sample filter assembly and piping between the sample media and stack wall.
9	If working on a scaffolding, secure tools so they don't get accidentally knocked off the scaffolding. Warn personnel below to remain away from the base of the scaffolding.
10	Don gloves to protect against possible contamination.
11	If the distance between the sample filter and sample probe is greater than the length of the flexible borescope, break the sample line near the stack wall. Removal of insulation may be required.
12	If required by the IWD, have an RCT survey for contamination. If contamination is found, consult with HSR-1 about how to proceed; an RWP and additional PPE may be required. If no contamination is found, continue with the inspection.
13	Use the UXR Borescope (follow Owner's Manual instructions for use of the borescope) to inspect sample line and nozzles; examine as much of the sample line as possible concentrating on bends or other areas where particulates could accumulate. Use 90-degree viewer if needed to look down nozzles in multi-point rake. Document all observations on the worksheet (Attachment 1).
14	If needed, attach camera and PC link to borescope to document findings with video record or image capture.
15	Examine the probes using the UXR Borescope for excessive material buildup, cracking, or other damage.
16	If probe needs cleaning, and IF the facility building will permit removal of the probe (some facilities will remove the probe themselves), follow the steps in the chapter "Cleaning Sampling Systems" for cleaning of the probe. Return to this step after cleaning. If cleaning is needed and the facility will not permit removal of the probe by MAQ, make arrangements for removal and cleaning. If probe appears damaged or otherwise inoperable, make arrangements for repair or replacement of the probe.
17	**At the LANSCE stacks only:** While the probe is disconnected from the sampling line, perform a leak test of the sampling system in accordance with MAQ-616, "Leak Checking LANSCE Stack Sampling System".

Steps continued on next page.

Inspecting Stack Sampling System, continued

Step	Action
Inspect external surfaces of probe	
18	Remove borescope from stack sample system. Wipe down scope with anti-contamination cloth. Treat "used" cloths as radiological trash. If you will be surveying another stack this one, bag or otherwise protect the probe from potentially spreading any contamination.
19	For inspection of the external surfaces of the stack sample probe, open access port in stack wall. This is typically the stack flow monitoring port.
20	If needed, attach camera and PC link to borescope to document findings with video record or image capture.
21	Insert the borescope into access port and inspect outside of sampling system.
Replace sample media	
22	Replace sample media and note date and time of sampling resumption.
23	If needed, re-connect sample lines that were dismantled to allow inspections access.
24	Contact local HSR-1 team for contamination survey of any equipment that was exposed to potential contamination from inside the stack during breach of the sampling system.
25	Perform visual inspection of sample line, looking for areas which could cause leaks in the line. Cover as much of the line between the probe and sample pump as possible. Check the tightness of fittings, unions, etc.
26	Before leaving the facility, have an RCT survey the equipment. If contamination is found, follow the RCT's instructions.

Document results

After completion of each stack inspection, document the results, with additional documentation of leaks repaired, etc., in the stack inspection logbook. Make all logbook entries in accordance with MAQ-011, "Logbook Use and Control".

Prepare a memo summarizing the test results and distribute the memo to:

- Facility manager
- Operating group division office
- MAQ Project Leader
- Rad-NESHAP File
- MAQ File

Cleaning Sampling Systems

When to use this chapter

This chapter describes the process to remove and clean a sample probe assembly from a monitored stack. This chapter is to be followed when directed here from the previous chapter when cleaning is needed and permitted by the facility.

The work in this chapter should not require an IWD, but this decision is at the discretion of the facility manager.

Steps to clean sampling rack

To clean a sampling rack, perform the following steps:

Step	Action
1	If not already done, remove MAQ sample media (paper filter and/or charcoal) and store in glassine envelope, according to MAQ-109 and/or MAQ-601. Note the date and time of removal.
2	Unplug stack sample pump.
3	Don gloves to protect against potential contamination.
4	If necessary, contact HSR-1 team for contamination survey during initial breach of system.
5	If not already disconnected during the inspection process in the previous chapter, break sample system at sample housing or at swagelok fitting near stack wall.
6	Remove bolts from sample system flange and store in large ziplock bag.
7	Carefully remove sample rake/probe from stack and wrap with plastic sheeting.
8	If necessary, remove sample filter housing and wrap in separate plastic sheeting.
9	Install blank flange on stack wall opening.
10	Transport sampling rake/probe and all other components needing cleaning to approved laboratory equipped with a fume hood.
11	Disassemble sampling rake nozzles and soak components in plain water for approximately 5 minutes. Using a non-abrasive cloth lightly scrub all components until clean. If water does not work, spray components with "Fantastic®" and allow to soak. Wipe components clean. A mild acid solution (e.g. vinegar) can be used if "Fantastic®" is ineffective.
12	After components are clean, wipe off excess liquid and allow to dry. If possible, obtain small sample of liquid to be analyzed.
13	Reassemble sample system components and reinstall on exhaust stack.

Steps continued on next page.

Cleaning Sampling Systems, continued

Step	Action
14	Contact local HSR-1 team for contamination survey of any equipment that was exposed to potential contamination from inside the stack during breach of the sampling system.

Annual summary of inspections

Annual summary of inspections

At the end of each calendar year, write a summary of inspections, identifying stacks, types of inspections, and results. Address all maintenance and inspection items identified in Table 2 of 40 CFR 61, Appendix B, Method 114. Complete the summary before February 28th of the year following the inspection cycle.

Distribute copies of this summary to:

- Rad-NESHAP project leader
- Rad-NESHAP files
- DOE Los Alamos Site Office assigned representative
- EPA Region 6 representative
- MAQ memo file

Records resulting from this procedure

Records

The following records, or copies thereof, generated as a result of this procedure are to be stored or submitted **within 4 weeks of completion** as described below:

- A Memorandum for each stack sampling system
- annual summary of inspections, before February 28th of the year following the inspection cycle

Click here to record “self-study” training to this procedure.

Meteorology and Air Quality

Stack Sample System Inspection Worksheet

Page 1 of 2 This form is from MAQ-142

TA:_____ BLDG: _____ ES: _____ DATE: _____

CREW:_____

Probe Type: Rake Shrouded Probe System Monitors: Particulate Tritium Gas

Reason for Inspection: Routine Special Other:

Security Needed? ☐Y ☐N Comment: _____

RCT Needed? ☐Y ☐N Comment: _____

Local Power? ☐Y ☐N Sample Station Outlet Used? ☐Y ☐N Comment: _____

If Sample Station Outlet used, time power turned off:_____ Back on: _____

Sample Filter Removed? ☐Y ☐N Comment:_____

If Sample Filter Removed, time removed:_____ Time re-installed: _____

INSPECTION REQUIREMENTS

	Yes	No	N/A
Upon visual inspection, is the interior of the sample filter housing free of any foreign deposits or dust loading? Comment:	☐	☐	☐
Upon visual inspection, are the interior surfaces of the sample filter housing smooth? Comment:	☐	☐	☐
Upon visual inspection, is the O-Ring gasket in place and in good condition? Comment:	☐	☐	☐
Upon visual inspection, is the filter support grid free of any deposits or defects? Comment:	☐	☐	☐
Upon inspection using the borescope, is the interior of the main transport line free of corrosion, foreign deposits or dust loading? Comment:	☐	☐	☐
Upon inspection using the borescope, is the sampling nozzle(s) free of corrosion, foreign deposits or dust loading? Comment:	☐	☐	☐
Upon inspection using the borescope, are the main transport line, welds and nozzle(s) free of any evidence of physical damage? Comment:	☐	☐	☐
Upon inspection using the borescope, are the inlets to each nozzle/probe smooth and free of burrs and debris? Comment:	☐	☐	☐
Upon inspection using the borescope, is the transport line between the sampling system and the sample housing free of foreign deposits? Comment:	☐	☐	☐
Have pitot tube systems been inspected for leaks? (TA53 only) Comment:	☐	☐	☐

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Stack Sample System Inspection Worksheet

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	Yes	No	N/A
Have sample transport lines been tested or inspected for leaks? Comment:	☐	☐	☐
Does inlet face of nozzles appear to be perpendicular to flow? Comment:	☐	☐	☐

Video/Picture File Names: _____

Summary Memo Number: _____ Copies to Facil Mgr, Facility POC, Environ. POC

Further Action Needed? ☐Yes ☐No Comment:

Measurements performed by:

_____	_____	_____	_____/_____/_____
Signature	Print name	Z-Number	Date

QA check by:

_____	_____	_____	_____/_____/_____
Signature	Print name	Z-Number	Date

MAQ review and approval by:

_____	_____	_____	_____/_____/_____
Signature	Print name	Z-Number	Date